Differentiated Instruction

Secondary Science - Thomas Campsey

Principals’ Breakout Session
December 6th, 2018

thank you
Differentiation is simply attending to the learning needs of a particular student or small group of students rather than the more typical pattern of teaching the class as though all individuals in it were basically alike.

-Leadership for Differentiating Schools & Classrooms by Carol Ann Tomlinson and Susan Demirsky Allan
The Common Sense of Differentiation

● Absolute clarity about the learning destination.

● Persistently knowing where all students are in relation to the destination all along the way.

● Adjusting teaching to make sure each student arrives at the destination and, when possible, moves beyond the destination.
Teachers can differentiate through...

- **Content** - The **information** students learn or ways students **access** the information.
- **Process** - **How** students take in and **make sense** of the content.
- **Product** - **How students show** what they know, understand, and can do.
- **Environment** - The **climate** or tone of the classroom.
Differentiating The Content

“The what” we want students to Know, Understand, and be able to Do.

We tend to differentiate how they access the what…

- Using video instead of text.
- Small Group Instruction
- Hands-on Modeling
- Provide a partially completed organizer

In Secondary Science, differentiating content looks like...

- Pre Teaching Vocabulary or providing vocabulary resources for struggling students
- Scaffolding Learning Targets
- Asking students to draw pictures or diagrams
- Providing a graphic organizer
Proficiency Scales

In simple terms, a proficiency scale can be thought of as the organization of important content for a specific topic into levels of difficulty: (1) the target content, (2) the simpler content, and (3) the more complex content. (Marzano, 2016).

**Emerging**

**Recognize and Recall**

**Goal:** Provide students with cognitive skills that purposefully and strategically promotes understanding of vocabulary and facts.

**Approaching**

**Connect concepts/terms to other concepts/terms**

**Goal:** Provide students with cognitive skills that purposefully and strategically promotes understanding of vocabulary and connection between concepts.

**Mastery**

**Transfer knowledge to new concepts and produce a novel student product**

**Goal:** Provide students with cognitive skills that purposefully and strategically promotes analysis, inference, and real world connection, so that students generate higher order thinking and questions.
# Proficiency Scales

**Skill**

<table>
<thead>
<tr>
<th>Level</th>
<th>TEKS: 6.7A</th>
<th>Goal: Provide students with cognitive skills that purposefully and strategically promotes analysis, inference, and real-world connection so that students generate higher order thinking and questions.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research and discuss the advantages and disadvantages of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources.</td>
<td>MEETS</td>
</tr>
<tr>
<td></td>
<td>1. Given several models, I can discuss the advantage of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources.</td>
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<td></td>
<td>2. Given several models, I can discuss the advantage of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources.</td>
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<tr>
<td></td>
<td>3. I can clarify the following misconceptions:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>^ energy is lost in energy transformation</td>
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</tbody>
</table>

**Goal**

**Learning Target**

<table>
<thead>
<tr>
<th>TEKS: 6.8A</th>
<th>Compare and contrast potential and kinetic energy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Given several models, I can compare potential and kinetic energy.</td>
<td></td>
</tr>
<tr>
<td>2. Given several models, I can contrast potential and kinetic energy.</td>
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<tr>
<th>TEKS: 6.9A.B.C</th>
<th>6.9A investigate methods of thermal transfer, including conduction, convection, and radiation.</th>
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<tbody>
<tr>
<td>6.9B verify through investigations that thermal energy moves in a predictable pattern from warmer to cooler until all the substance attain the same temperature such as an ice cube melting.</td>
<td></td>
</tr>
<tr>
<td>6.9C demonstrate energy transformations such as energy in a flashlight battery changes from chemical energy to electrical energy.</td>
<td></td>
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</table>
Differentiating The Process

The “sense-making activity” we want students to do in order to “own” what they learned.

Students practice using...

- Partners or Individual practice
- Hands-on supports as needed
- Graphic Organizers
- Workstations

In Secondary Science, differentiating process looks like...

- Teach students what to say when they don’t know
- Use total response signals
- Structured Conversations
- Visual Representations of Vocabulary
- Use of Formula Triangles
- Differentiated Workstations
STAAR GRADE 8 SCIENCE REFERENCE MATERIALS

FORMULAS

Density = \( \frac{\text{mass}}{\text{volume}} \)
\[ D = \frac{m}{V} \]

Average speed = \( \frac{\text{total distance}}{\text{total time}} \)
\[ s = \frac{d}{t} \]

Net force = (mass)(acceleration)
\[ F = ma \]
Differentiating The Product
How students show us what they have learned.

Student evidence of learning can include...

● Providing Choice
● Presentations in different forms
● Allowing the Use of Technology
● Task Menus

In Secondary Science, differentiating the product looks like...

● Anchor Activities
  ○ Tasks students move to after completing assigned work
● Learning Menu
  ○ Provides Student Choice in selecting assigned work
● Branched Google Forms
  ○ Creates custom learning path for student based on responses
● Exit Ticket with Options
Using Anchor Activities to Create Groups

1. Teach the whole class to work independently and quietly on the anchor activity.

2. Flip-Flop
   - Half the class works on anchor activity.
   - Other half works on a different activity.

3. 1/3 works on anchor activity. 1/3 works on a different activity 1/3 works with teacher--direct instruction.

Menu Planner

Menu for: __________________________ Due: __________________________

All items in the main dish and the specified number of side dishes must be complete by the due date. You may select among the side dishes and you may decide to do some of the desserts items, as well.

Main Dishes (complete all)

1
2
3
4

Side Dishes (Select ______)

1
2
3
4

Desserts (Optional)

1
2
Differentiating The Environment

The setting of the classroom where students are learning.

Differentiating the environment includes:

- Student Groupings
- Group Roles
- Co-teaching models
- Work Spaces

In Secondary Science, differentiating environment looks like...

- Furniture Arrangements
- VDI based Workstations
  - 7 per MS Lab
  - 14 per HS Lab
- Practice Style
  - Adding Movement, such as Scavenger Hunts or See, Run, Do
- Co-Teach Model
- Problem Solving Corners/Check Yourself Stations
Teachers can differentiate according to the student’s...

- **Readiness** - A student’s proximity to specified learning goals.
- **Interests** - Passions, affinities, kinships that motivate learning.
- **Learning Profile** - Preferred approaches to learning.
Differentiating According to Students’ Readiness

This is acknowledging students are at different levels of understanding and need different entry points to interact with the content.

In Secondary Science, differentiating according to readiness looks like...

- Using proficiency scales to meet students where they are at
- Students at emerging level need time to work their way through foundational knowledge before they can apply what they learn
- Work Stations of Varied Complexity
Differentiating According to Students’ Interests

This is acknowledging students have different interests and need different entry points to interact with the content.

In Secondary Science, differentiating by interest looks like...

● Project/Product Based Learning
● Home Connections
● Menus and Choice
● Designing their own investigations
● Choice in productivity software or apps they use to present with
Differentiating According to Students’ Learning Profile

This is acknowledging students have different learning styles and teachers need to provide different modes of learning.

In Secondary Math, differentiating by learning style looks like...

- Providing hands-on learning
- Allowing for use of dry-erase markers with boards or on the desk
- Allowing for partners and individual practice
- Menus and Choice
I acknowledge that you have different interests. I also acknowledge your teachers are at different readiness levels for this topic. Therefore, for the remainder of our time, I am going to differentiate the next task.
Tic-Tac-Toe Menu - Think about how this is a tool for differentiation, and how you can improve it.

<table>
<thead>
<tr>
<th>Create a frayer model representation for one form of potential energy</th>
<th>Draw a diagram that shows an energy transformation where potential energy is converted to potential energy.</th>
<th>Corn can be used as a food we eat or to create biofuels. List and describe some ways corn is used as a form of potential energy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the forms of energy used in the diagram below</td>
<td>Research the sources of energy used by San Antonio City Public Service and discuss the advantages and disadvantages of those sources</td>
<td>Identify the forms of energy used in the diagram below</td>
</tr>
<tr>
<td>How do home phones (wired) use a different form of kinetic energy from cell phones (wireless)?</td>
<td>Create a venn diagram that demonstrates how the different forms of energy are classified as kinetic and potential</td>
<td>Create a frayer model representation for one form of kinetic energy</td>
</tr>
</tbody>
</table>
Thank You

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